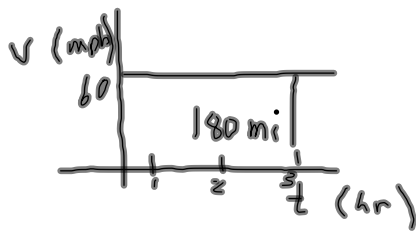
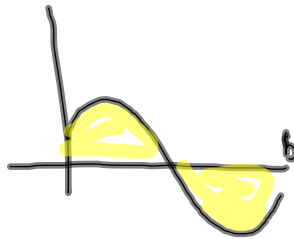


7.1 Integral as net change



$$\int_0^3 60 \, dx = 180 \text{ mi}$$

rate

displacement
(distance from
start to end)

displacement = net change in position

$$\int_0^b v \, dt = 0 \quad \text{still displacement}$$

$$\text{final position} = \text{initial position} + \text{displacement}$$

$$\int_a^b v(t) \, dt$$

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$$\int_{t_i}^{t_f} a(t) \, dt = \text{net change in velocity}$$

acceleration

$$a = 2.4t \quad (t - \text{sec}) \quad a: \left(\frac{\text{mph}}{\text{sec}} \right)$$

$$v_i = \underline{5} \text{ mph}$$

$$\text{How fast at } t = 8? \quad (v(8) = ?) = 81.8$$

final velocity

$$\int_0^8 2.4t \, dt = 1.2t^2 \Big|_0^8 = 76.8 \text{ mph}$$

net change

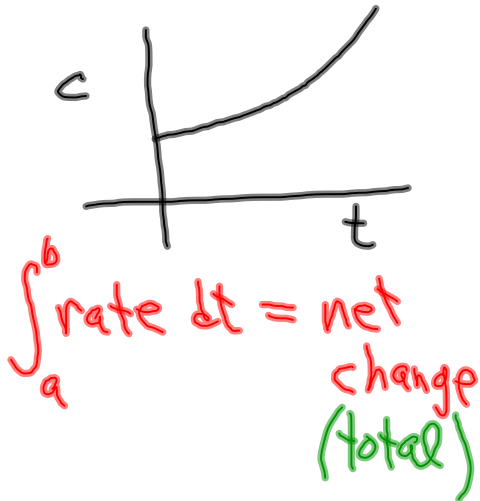
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Ex 5 potato consumption

$$C(t) = 2.2 + 1.1t^2$$

$C = \frac{\text{Mbu}}{\text{yr}}$ millions

$t = \text{yrs since 1970}$



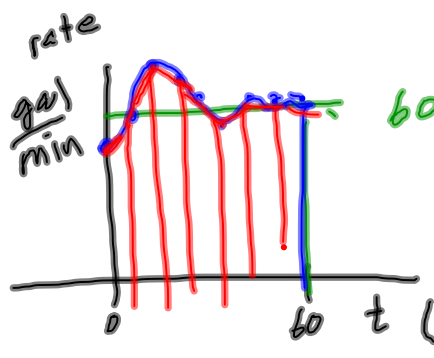
How many bushels consumed from beginning of 1972 to end of 1973?

$$\int_2^4 2.2 + 1.1t^2 dt = 7.066 \text{ Mbu}$$

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Ex 6

| time | rate $\frac{\text{gal}}{\text{hr}}$ |
|------|-------------------------------------|
| 0 | 58 |
| 5 | 60 |
| 10 | 65 |
| 15 | 64 |
| ... | ... |
| 55 | 63 |
| 60 | 63 |



$$\frac{h}{2} (y_0 + 2y_1 + 2y_2 + \dots + y_n)$$

$$\frac{5}{2} (58 + 2 \cdot 60 + 2 \cdot 65 + \dots + 63)$$

3587.5 gal

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$$\text{Work} = \int_a^b \text{Force } dx$$

Ex 7 spring $F = kx$

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